Arguments/Remarks

Applicants' invention relates to a process for the production of acrylonitrile or methacrylonitrile by the ammoxidation of an alkane or alkene.

In such processes for the production of acrylonitrile, the current conventional commercial process scheme is as follows:

1. propylene, ammonia and air (oxygen) react in a fluid reactor to produce a gaseous effluent comprising acrylonitrile and some HCN,
2. the reactor effluent is passed into a Quench Column and contacted with a water spray to cool the acrylonitrile and also contacted with sulfuric acid to remove unreacted ammonia as ammonium sulfate,
3. an overhead stream form the Quench Column comprising the cooled acrylonitrile vapor, is sent to an Absorber column where the acrylonitrile vapor is contacted with water yield an aqueous bottoms stream containing acrylonitrile and a top stream comprising waste gas,
4. the bottoms stream from the Absorber is sent to a first distillation column (Recovery Column) to remove water and other impurities as a bottoms stream,
5. a top stream from the 1st distillation column (comprising acrylonitrile and HCN) is sent to a 2nd distillation column (Stripper Column or HCN Product Column) to remove product HCN as an overhead stream and acrylonitrile and water as a bottoms stream, and
6. the bottoms stream form the 2nd distillation column is sent to a 3rd distillation column (the Acrylonitrile Product Column) for final distillation of the acrylonitrile.

In the above process, an alkaline compound is added to the Recovery Column to control the pH of this column which in turn drives the extractive distillation such that useful products such as acrylonitrile and HCN exit the Recovery Column as an overhead stream while water and other impurities exit the Recovery Column as a bottoms stream.

It is known to use certain alkaline or alkaline earth metal salts, such as Na_2CO_3, to control the pH of the Recovery Column. The instant invention relates to the use of different types of alkaline compound for this purpose. Specifically, the instant invention relates to the use of an alkaline compound selected from the group consisting of ammonium carbonate, ammonium bicarbonate, alkylene diamines and mixtures thereof. As set forth in the Specification on page 3, line 12 through page 4, line 4, the use of such compounds alleviates the treatment of wastewater streams comprising metal salts and benefits overall plant performance and reliability (i.e. less shutdowns due to fouling).

Rejection under 35 USC 112.

Claims 1-7 are rejected under 35 USC 112, second paragraph as being indefinite. Specifically, the Examiner objects to the expression, "In a process" which is employed in these claims.

In order to overcome this rejection, claims 1-7 have been amended to remove this phrase and refer more simply to a "process".

Claims 1-6 are rejected under 35 USC 103(a) as being unpatentable over Godbole (USPN 6,793,776) and Rescalli et al. (USPN 3,896,007), in view of GB Patent No. 821,958 to American Cyanamid (hereinafter referred to as GB '958).

The Examiner asserts that Godbole teaches generally a process for the production of acrylonitrile, Rescalli et al. teach the control of the pH at between 5.5 and 7.5 for an extractive distillation column in an acrylonitrile process and, lastly, GB '958 teaches the adjustment of the pH during the purification of acrylonitrile using a variety of listed materials which include ammonium carbonate.

Applicants respectfully traverse.

Applicants acknowledge that Godbole and Rescalli et al. are representative of the art to which the invention relates. However, GB '968 relates to a different era of acrylonitrile production technology and chemistry and is non-analogous art to current acrylonitrile technology. Specifically:

1. GB'958 relates to the production of acrylonitrile resulting from the reaction of acetylene with HCN. Note GB '958 dates from the mid 1950's. Prior

to the early 1960's and the development of processes for the ammoxidation of propylene to acrylonitrile, the reaction of acetylene and HCN was the commercial route for acrylonitrile production. As such, GB'958 relates to a different chemical process and different process chemistry.

2. The recovery scheme for the GB '958 acetylene to acrylonitrile process is different than current ammoxidation processes. Specifically, after the reactor, GB '958 describes an absorber followed by a steam stripper followed by distillation. In contrast, current ammoxidation processes do not employ steam stripping.

3. The processes control pH in different locations. In GB '958, the "pH adjustors" are added to the absorber or to the stripper. In contrast, in current ammoxidation processes, the alkaline compound is added to the Recovery Column (i.e. the first distillation column).

4. GB '958 is seeking to remove different chemical species than those removed in the Recovery Column of an ammoxidation process. The main purpose of GB '958 seems to be to control pH so that HCN and acetaldehyde can be driven overhead in their stripper, avoiding toxic lactonitrile (which dissociates to acetaldehyde and HCN) in the bottoms stream (see column 2, lines 54-79). In the instant application, Applicants are controlling pH in their Recovery Column so that acrolein and "peroxides" are removed via the aqueous bottoms streams. Consequently, in comparing the process of instant application to the process of GB '958, the purpose for the addition of base to control pH is quite different, and the reactions being controlled by the addition of base are also different (acrolein reactions with water and/or HCN). Acrolein, to Applicant's knowledge, is not a significant by-product of an acetylene/HCN process for making acrylonitrile.

For these reasons (different reactants, different process, different process unit operations, different location for pH control, and different impurities being removed), GB '958 clearly teaches a different process and is non-analogous art. One skilled in the art would not look to combine the teachings of GB '958 with Godbole and Rescalli et al.

Lastly, the combination of Godbole, Rescalli et al., and GB '958 does not render the instant invention obvious.

A final point with respect to claims 5, 6, and 7, while Applicants believe that all claims of the instant application are patentable over the cited references, there are no suggestions or teaching in the cited references that (i) ammonium carbonate can be generated in situ for pH control or (ii) that an alkylene diamine can be used for pH control. As such, claims 5, 6, and 7 are clearly patentable over the cited references.

Summary

GB '958 is non-analogous art. One skilled in the art would not look to combine the teachings of GB '958 with Godbole and Rescalli et al. Lastly, the combination of Godbole, Rescalli et al., and GB '958 does not render the instant invention obvious.

Applicants have shown their invention to be patentable over the cited reference. As such, Applicants respectfully request the Examiner to withdraw the rejection and forward the application to issuance.

Respectfully submitted,

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